

ABSTRACT OF THE INVENTION

Method and apparatus for converting hydrocarbon fuels to hydrogen-rich reformat that incorporate a carbon dioxide fixing mechanism into the initial hydrocarbon conversion process and for providing a continuous supply of hydrogen-rich reformat. The apparatus includes a reforming reactor that has a catalyst bed comprising a reforming catalyst, a carbon dioxide fixing material and an optional water gas shift catalyst; a hydrogen storage device for storing reformat; and a controller for controlling the delivery of reformat from the reactor and/or storage device to an outlet. Optionally, the apparatus can include a heating device for heating the catalyst bed and a polishing unit for removing impurities from the reformat. The reforming reactor is operable in reforming and non-reforming modes. During non-reforming modes, the hydrogen storage device provides reformat to the outlet so as to maintain a continuous supply of reformat. A method for providing a continuous supply of hydrogen-rich reformat for use in a hydrogen-consuming device or process is also provided.